Kentucky Avenue Bridge over Rock Creek
KCMO Bridge No. S022B21
Bridge Rehabilitation Study

Prepared for

Kansas City, Missouri

July 14, 2020

LOCHNER

City of Kansas City, Missouri
Public Works Department

Kentucky Avenue Bridge over Rock Creek (Br. No. S022B21)
Bridge Rehabilitation Study

EXECUTIVE SUMMARY

The bridge that carries Kentucky Avenue over Rock Creek is currently closed to traffic due to a hole in the deck.

The purpose of this study was to evaluate the scope and construction costs of short term repairs that would allow this bridge to re-open and safely carry traffic for 5 to 10 years, until a replacement structure can be budgeted and constructed. In order to properly evaluate these costs, we also determined construction costs for a rehabilitation project that would provide a service life of 25 years or more, and a replacement alternative that would provide a service life of 75 to 100 years.

The short term bridge repair alternative includes removing the existing asphalt overlay on the deck, patching active spalling areas in the concrete deck, and replacing the asphalt overlay. The anticipated construction cost for this alternative is $150,000. We also recommend lowering the posted load limit on the bridge from 24 tons to 20 tons to remove some of the heavy trucks from the bridge.

The bridge rehabilitation alternative includes replacing the bridge superstructure, repairing the substructure and performing enough approach grading to tie back into the existing roadway. The anticipated construction cost for this alternative is $700,000. It will include relocation of the gas line attached to the bridge and the river gauge equipment under the bridge.

The bridge replacement alternative includes replacing the bridge on the same alignment with a slightly longer structure and performing enough approach grading to tie back into the existing roadway. The anticipated construction cost for this alternative is $1,200,000. It will include relocation of the gas line attached to the bridge and the river gauge equipment under the bridge.

The table below shows a summary of the costs for the alternatives:

Alternative	Anticipated Cost to Construct	Expected Service Life
Short Term Bridge Repairs (Deck Repairs)	**$150,000**	**5-10 years**
Bridge Rehabilitation (Superstructure Replacement)	**$700,000**	**25-50 years**
Bridge Replacement	**$1,200,000**	**75-100 years**

Based on the current budget availability and the desire to open the bridge to traffic as soon as practical, it is our recommendation that the short term bridge repairs (deck repairs) alternative be constructed. It is the most cost effective alternative to re-open Kentucky Avenue. This alternative would provide another 5-10 years of service life for the existing bridge, during which the City could plan and budget for a replacement bridge.

SUMMARY REPORT

Purpose of Project

The bridge that carries Kentucky Avenue over Rock Creek is currently closed to traffic due to a hole in the deck. The City has installed temporary concrete barriers blocking vehicular traffic at each end of the bridge. This bridge connects Kansas City with Independence. While the traffic count on the bridge is not too high (+/- 2,000 VPD) there is a desire to re-open the bridge. Unfortunately the City's budget does not allow for total replacement of the bridge, so the purpose of this study is to look at three options for the bridge: total replacement, that would be expected to have a service life of 75 to 100 years; superstructure replacement, that would have a service life of 25 to 50 years; and minimal deck repairs that would allow the bridge to be re-opened but would have a service life of 5 to 10 years. The costs for the shorter-term repairs will be compared to the costs for total replacement to help determine if it is worth the investment to do either of the repair alternatives.

Study Team

The lead consultant for this study is H.W. Lochner, Inc. Lochner was assisted by Alfred Benesch & Company for the deck thermal imaging.

Description of Bridge

The bridge is located on Kentucky Avenue in the northeast portion of the City, bordering with the City of Independence, as shown on the **Location Map** in **EXHIBIT A**. The bridge is described below:

Name:	Kentucky Avenue over Rock Creek
Bridge Number:	S022B21
Year Built:	1932
Sufficiency Rating:	46.6 (2018)
Length:	92'
Spans:	22'-47.5'-22'
Deck Width:	22.5'
Roadway Width:	20.0'
Sidewalks:	none
Utilities:	12 in. diameter gas line attached to the south side bridge rail. Overhead power and cable on each side of the bridge. Sanitary sewer pipe crossing the creek +/- 25 ft. north of the bridge owned by the City of Independence. There is a City of Independence Wastewater Treatment facility on the parcel just northwest of the bridge. There is a river gauging station at the NW corner of the bridge with intake pipes laying on the ground under the west span.

Type of Construction: Reinforced concrete slab approach spans and reinforced concrete tee girder main span. The concrete bridge deck has a 2-3" thick asphalt overlay.

Posting: Gross Load 24 Tons

Existing Bridge Conditions

In the 2018 biennial bridge inspection report for this bridge, the overall condition is described as being Fair. Subsequent to that inspection a hole developed in the bridge deck at the east end of the main span, and the bridge was closed to vehicular traffic. The condition of the top surface of the concrete deck cannot be determined by conventional methods because of the asphalt overlay. The overlay is in poor condition. The bridge barriers are in fair condition with cracking and deterioration, and exposed reinforcing steel along the curb lines. The bottom of the deck has cracking with efflorescence in all spans. The tee girders in the main span, the piers and abutments all have areas with spalling and exposed reinforcing steel. In general, the slab spans, main girders, and substructure members are in fair condition and do not warrant immediate replacement. In the current condition, the bridge likely would be eligible for federal replacement funds.

In order to gain a better determination of the condition of the bridge deck, the City authorized Lochner to subcontract with Benesch to perform an inspection of the deck using drone mounted thermal imaging. In theory, thermal imaging will allow us to find delaminations under the asphalt overlay that cannot be detected visually or by sounding. See the **Thermal Inspection Report Map, EXHIBIT B**. By measuring temperature differentials in the deck, the thermal imaging identified four damage area rating levels: from level one with no concerns about active delaminations to level four with a very high probability of delaminations. Unfortunately, due to the heavy amount of contamination on the deck the thermal imaging did not give usable results for over 50 percent of the deck area. (The future use of thermal imaging should require proper cleaning of the deck beforehand to reduce this problem.) Of the area that could effectively be imaged, about 36 percent of that area was classified as levels two, three or four. In order to estimate the total amount of delaminated areas in the deck, we used that same percentage for the entire deck.

Bridge Replacement Alternative

Hydraulics and hydrology: Survey or a detailed stream study were not included in the scope of this study, so general conclusions about the size of a new bridge were determined from available information. This structure is located at the downstream end of the FEMA detailed study area on Rock Creek. From the FIRM maps show at the right, the one percent (100 year) flood does not overtop Kentucky Avenue and the floodway is contained between the abutments of the existing bridge. The flood contours

indicate that floodwaters stack up behind this bridge and the two railroad bridges that are within 300 feet upstream of this bridge.

Replacement Structure Size: It appears that replacing the Kentucky Avenue Bridge with a much larger structure to accommodate the one percent flood without restrictions would reduce some flooding between the roadway and the adjacent railroad track, but it would have minimal effects on upstream flooding due to the restrictions of the existing railroad bridges. For this study, our approach was to consider a replacement bridge that does not encroach on the existing floodway, allows the new substructure units to avoid the existing ones, provides room for some bank stabilization, and does not require a grade change on Kentucky Ave. While we believe this is a logical approach for a study of this nature, we are unable to determine from the available information if this bridge could be permitted at either a State or Federal level.

The recommended bridge is a three span structure with a 60-foot long center span and 33-foot long approach spans. Recent experience indicates that a prestressed concrete box girder or small I-girder bridge will be the most cost effective structure type for this bridge. We propose a 32' roadway width for the bridge which will allow for two 12-lanes and 4 foot shoulders, or two 6-foot bike lanes and two 10-foot traffic lanes. Either configuration should be adequate for bridge with traffic counts under 3,000 VPD.

Utilities: The gas line on the bridge will need to be temporarily or permanently relocated. Since it is a private utility on public right-of-way, we assume that the utility owner will pay for that move. The gauging station will have to be temporarily relocated or taken out of service for this project. We do not anticipate other utilities needing to be moved as part of the project.

Construction Costs: The new bridge, with approach slabs, new guard fence and enough grading/paving to tie it back in to the existing roadway section is expected to cost $1,200,000 (in 2021 dollars). See **Opinion of Probable Bridge Replacement Cost, EXHIBIT C**. This cost includes mobilization and contingency, but does not include utility relocations, right-of-way/easements, engineering design or construction inspection services.

Bridge Rehabilitation Alternative

The goal of a rehabilitation project on this bridge would be to end up with a structure that can safely carry traffic loads for 25 to 50 years without significant additional repairs. Often redecking a bridge is seen as a favored type of rehabilitation, but this does not seem like a viable option for this structure. The approach spans are slab spans so redecking them would replace the entire superstructure. The main span is cast-in-place concrete tee girders that are monolithic with the concrete deck. This type of structure typically would require shoring to replace the deck, which is problematic with a stream crossing. Therefore, we recommend total replacement of the bridge superstructure as the preferred rehabilitation option.

The scope will include removing the two approach slab spans and the entire tee girder main span. Deteriorated portions of substructure members will be repaired, and the top portions of the piers and abutments will be modified to accept the new superstructure units. The new bridge superstructure will

consist of 17-inch deep and 27-inch deep prestressed concrete box girders with a 24' wide cast-in-place deck. Other repairs will include new bridge rail, approach guardrail and enough approach grading and paving to tie the new bridge into the existing roadway.

Utilities: The gas line on the bridge will need to be temporarily or permanently relocated. Since it is a private utility on public right-of-way, we assume that the utility owner will pay for that move. The gauging station will have to be temporarily relocated or taken out of service for this project. We do not anticipate other utilities needing to be moved as part of the project.

Construction Costs: Repairing and modifying the substructure members, constructing the new bridge superstructure, with approach slabs, new guard fence and enough grading/paving to tie it back in to the existing roadway section is expected to cost $700,000 (in 2021 dollars). See **Opinion of Probable Bridge Rehabilitation Cost, EXHIBIT D**. This cost includes mobilization and contingency, but does not include utility relocations, right-of-way/easements, engineering design or construction inspection services.

Short Term Bridge Repairs (Deck Repairs) Alternative

This alternative is to do the minimal repairs required so that the bridge can safely carry traffic for an additional 5-10 years without significant additional investment. The approach to this repair will be to mill off the asphalt overlay, patch concrete deck areas with active spalling - either full or partial depth - and place a new asphalt overlay on the deck. The existing bridge rail and approach guardrails will not be addressed as part of this alternative. The current load posting for the bridge is 24 tons. No plans are available for the existing bridge so it cannot be accurately load rated. Since no signs of structural distress are noted, it would be acceptable to leave the current posting. However, since the nature of this alternative is not to repair everything that is wrong with the bridge, the City might consider lowering the post to 15 or 20 tons. This would allow most type of residential traffic to cross the bridge, but could discourage heavy truck loads from nearby commercial sites.

The substructure of this bridge, particularly the piers, have many places with deterioration and spalling that are not structural in nature. For the short term repairs, we recommend just knocking off the loose concrete and coating the exposed surfaces with an epoxy material to inhibit the continued deterioration of the concrete and reinforcing steel.

Utilities: We do not anticipate any of the existing utilities will be affected by this project.

Construction Costs: The anticipated construction costs for this short term repair alternative is $150,000 (in 2021 dollars). See **Opinion of Probable Bridge Repair Cost, EXHIBIT E**. This cost includes mobilization and contingency, but does not include engineering design or construction inspection services. With this type of repair, we suggest that one of our design engineers be involved in the construction inspection services for the project to help limit the contractor to only those repairs deemed necessary.

Evaluation of Alternatives

Bridge Replacement Alternative

The positive aspects of this alternative are that it would provide a modern bridge with a 75-100 year service life. The negative aspects are this is the most expensive alternative, it has the most impacts on utilities and right-of-way, and it would keep Kentucky Avenue closed to traffic the longest—likely 2-3 years—of the three alternatives considered.

Bridge Rehabilitation Alternative

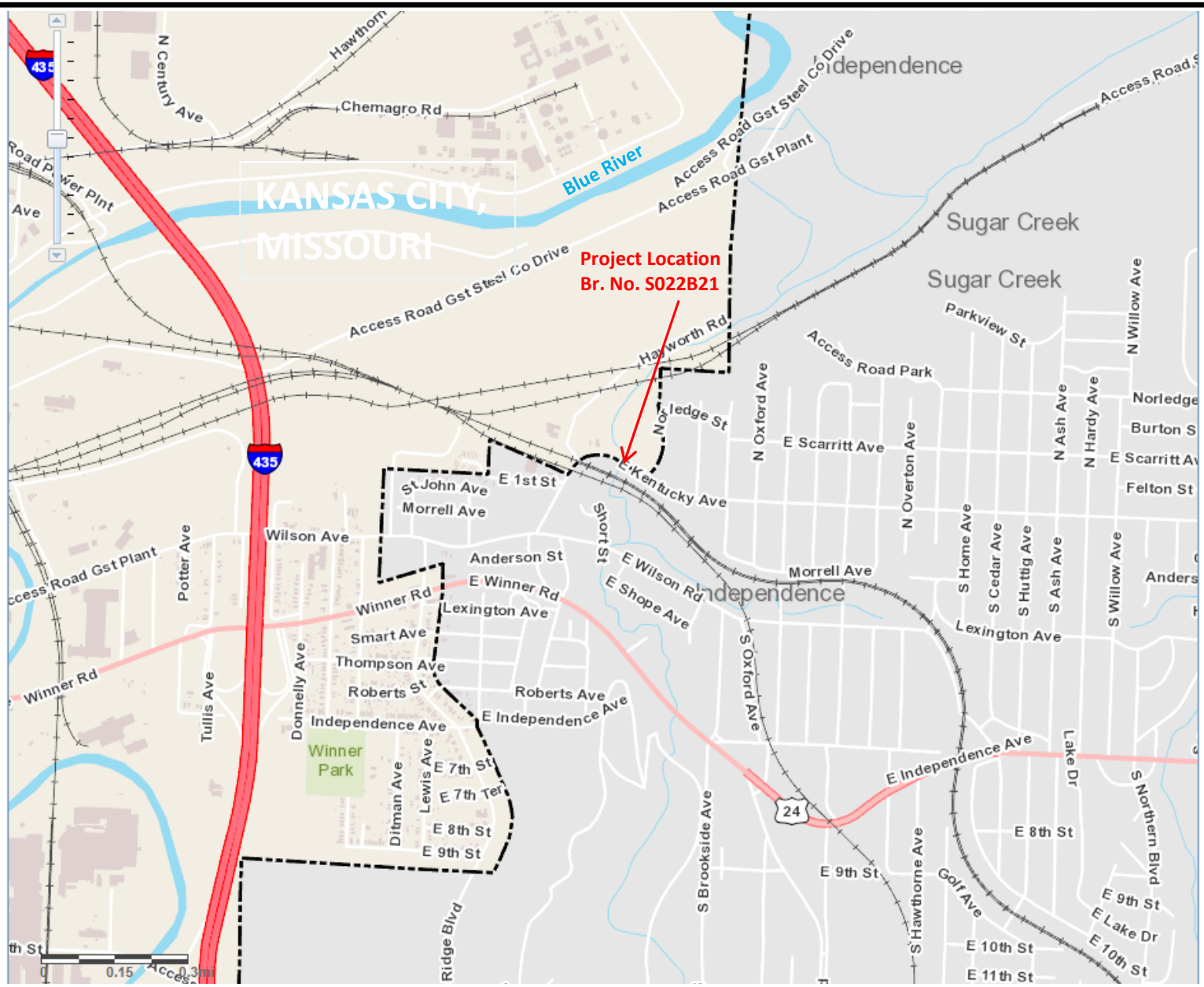
The positive aspects of this alternative are that it is about $500,000 less expensive to construct than the bridge replacement alternative, it would provide a 24 ft. bridge roadway width instead of only 20 ft. for the existing bridge, it would extend the service life of the bridge 25-50 years, and it could be accomplished in 1-2 years instead of 2-3 years for bridge replacement. The negative aspects of this alternative are that the existing substructure units would remain in service, and it would keep Kentucky Avenue closed to traffic for another 1-2 years.

Short Term Bridge Repairs

The positive aspects of this alternative are that it is the least costly alternative to re-open Kentucky Avenue, and it could be accomplished the fastest—only 4-8 months. The negative aspects of this alternative are that most members of the nearly 90 year-old existing bridge would remain in service, the bridge roadway width would remain at only 20 ft. for two lanes of traffic, and the expected service life of the bridge would be extended only 5-10 years.

Recommendations

In consideration of the desire to re-open the bridge to traffic as soon as possible and the overall project costs, we recommend that the short term bridge repairs (deck repairs) alternative be selected. This alternative is the fastest and most cost effective alternative to re-open Kentucky Avenue. With the superstructure and substructure of the existing bridge being in fair condition currently, the construction of select bridge deck repairs would provide another 5-10 years of service life for the existing bridge. After completion of the short term bridge repairs, the City could use the 5-10 years of remaining service life to plan and budget for a replacement bridge.



LOCHNER

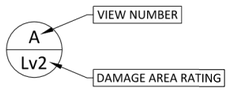
LOCATION MAP - EXHIBIT A

Kentucky Avenue Bridge, Br. No. S022B21, City of Kansas City, MO

Source: KCMO Online Mapping (Parcel Viewer) Scale: Not to Scale

N

DAMAGE AREA RATING SCALE



- LEVEL #1:
  - AREAS DETECTED BY THERMAL CAMERA AS SUSPICIOUS OR PLAUSIBLE.
  - DESCRIPTION: THIS RATING IS RECORDED TO DOCUMENT AREAS OF SUSPECT FOR FUTURE COMPARISON TO VALIDATE ANY CONTAMINATION IN THE THERMAL RECORDINGS. THIS AREA MAY HAVE ALREADY CAME TO THE SURFACE AND REPAIRED. NO STRUCTURAL REVIEW IS WARRANTED.
- LEVEL #2:
  - AREAS DETECTED BY THERMAL TO HAVE A LOW PROBABILITY OF DELAMINATION.
  - DESCRIPTION: DUE TO THE LOW APPARENT RISK, THE THREAT OF IMMEDIATE GROWTH, AND GENERALLY SMALL SIZE OF DAMAGE THIS AREA DOES NOT WARRANT A STRUCTURAL REVIEW AND SHALL BE RECORDED FOR FUTURE EVALUATION AND COMPARISON IN SIZE AND SCALE OF DAMAGE.
- LEVEL #3:
  - AREAS DETERMINED TO HAVE A MODERATE PROBABILITY OF DELAMINATION.
  - DESCRIPTION: DUE TO THE SIZE AND INTENSITY OF DAMAGE THIS AREA SHOULD BE RECORDED FOR FOLLOW UP AND COMPARISON TO EVALUATE THE SPREAD AND INTENSITY OF DAMAGE GROWTH. THIS AREA DOES NOT WARRANT AN IMMEDIATE STRUCTURAL REVIEW BUT SHOULD BE FLAGGED FOR FUTURE ANALYSIS AND INSPECTION.
- LEVEL #4:
  - AREAS DETERMINED TO HAVE VERY HIGH PROBABILITY OF DELAMINATION AND ONLY LOCATED WITHIN A DRIVING LANE.
  - DESCRIPTION: THIS AREAS IS DEEMED TO HAVE A HIGH PROBABILITY OF ADDITIONAL DAMAGE GROWTH WITH POSSIBLE SURFACE EXTENSION OF DAMAGE IN THE NEAR FUTURE. THE CONDITION WARRANTS A STRUCTURAL REVIEW TO DETERMINE THE EFFECT ON STRENGTH OR SERVICEABILITY OF THE ELEMENT.

FLIGHT PARAMETERS

DATE: MAY 1, 2020
TIME: 10:15 to 11:00 AM
AMBIENT TEMPERATURE: 70°-75°
CLOUD: SUNNY
PRECIPITATION: NONE - DRY CONDITIONS

COMPUTATIONS

DECK SURFACE = ~ 2,000 SF
AREA OF DECK UNABLE TO SCAN = ~ 1,075 SF
AREA OF DECK SCANED = ~ 925 SF
DAMAGE AREA = ~ 330 SF
% DAMAGE = ~ 36%

CENTROID OF DAMAGE AREA POINT LIST

POINT TABLE		
AREA	NORTHING	EASTING
A	1072301	2796633
B	1072297	2796646
C	1072292	2796658
D	1072282	2796673
E	1072296	2796631
F	1072283	2796650

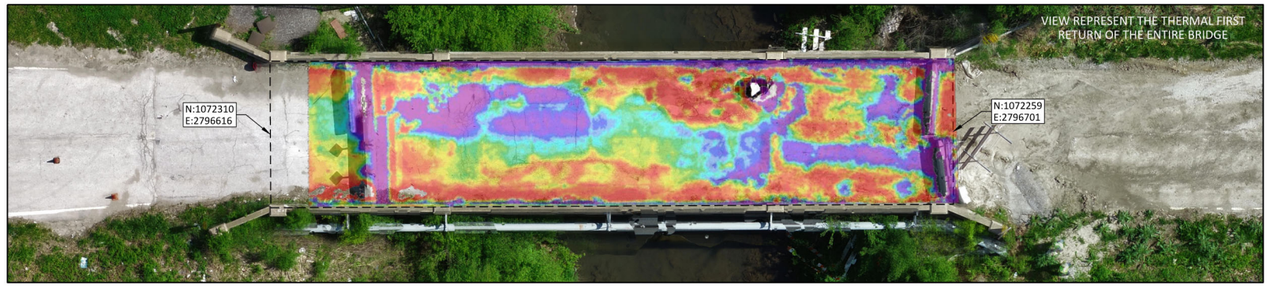
LEGEND

AREA OF PROBABLE DAMAGE

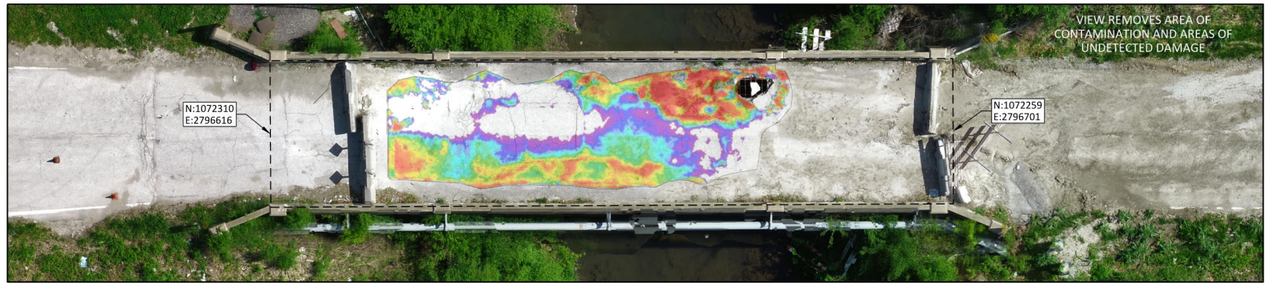
AREA OF NO RESULTS DUE TO CONTAMINATION OF DATA
(I.E. TREE CANOPY, DIRT, FOREIGN MATERIAL)

DISCLAIMER:
COORDINATES ARE BASED ON UAS EQUIPMENT GPS AND IS NOT TIED TO SURVEY MONUMENT CONTROL.
THERE IS NO GUARANTEE, EITHER EXPRESSED OR IMPLIED, THAT AREAS OF DETERIORATION MAY HAVE BEEN OR WILL OCCUR OUTSIDE THE DETECTED AREAS.

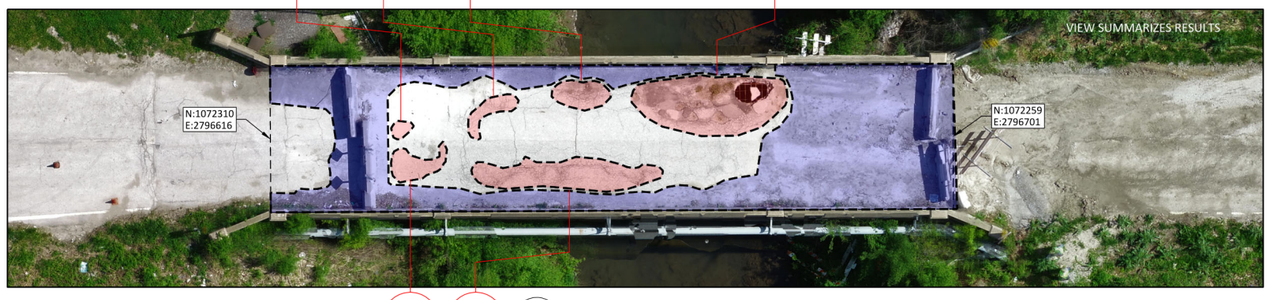
STEP #1: AERIAL
Scale: 1" = 10' (Full Size)



STEP 2: FIRST RETURN
Scale: 1" = 10' (Full Size)



STEP 3: CALIBRATED
Scale: 1" = 10' (Full Size)



STEP 4: RESULTS
Scale: 1" = 10' (Full Size)

EXHIBIT B

NO.	REVISIONS	DATE

THERMAL INSPECTION REPORT MAP

KENTUCKY AVENUE
KANSAS CITY, MISSOURI

benesch
Alfred Benesch & Company
3226 Kimball Avenue
Manhattan, Kansas 66503
785-539-2202

Job No. - 130674.00
DRAWN BY: BST
CHECKED BY: AM
QUANTITIES CHECKED BY: N/A

PROJECT: THERMAL INSP.
DATE: JUNE 2020
SHEET NO.: 1 of 1

EXHIBIT C

City of Kansas City, Missouri

Opinion of Probable Bridge Replacement Cost **Kentucky Ave. Bridge over Rock Creek**

Bridge Replacement **Bridge Number: S022B21**

Replace the existing 92 ft. long x 23 ft. wide bridge with a 130 ft. long x 35 ft. wide bridge.
With this bridge replacement, the expected service life of the bridge is 75-100 years.

Designed by: **MAH**
Date: **7/13/2020**
Job Number: **16882**

General Information:

- Replace the existing bridge with a three span prestressed concrete beam bridge.
- Construct concrete bridge approach slabs.
- Modify roadway approaches (grading and pavement) to accomodate higher bridge grade.
- Construct approach guardrail.

Repair Costs:

Removal	Comment	Unit	Cost / Unit	Number of Units	Total Cost
Demolition of Existing Bridge	92 ft. x 23 ft.	SF	$15.00	2115	$31,725
Bridge	**Comment**	**Unit**	**Cost / Unit**	**Number of Units**	**Total Cost**
Prestressed Concrete Beam Bridge	Proposed Spans: 33 ft. - 60 ft. - 33 ft.	SF	$130.00	4550	$591,500
Roadway / Grading / Miscellaneous	**Comment**	**Unit**	**Cost / Unit**	**Number of Units**	**Total Cost**
Roadway Grading and Surfacing	Grading and pavement on both bridge approaches	L.S.	$225,000.00	1	$225,000
Approach Guardrail	Install at all four corners of bridge	L.S.	$25,000.00	1	$25,000

Subtotal:	**$873,225**
9% Mobilization	**$105,000**
25% Contingency	**$211,775**
TOTAL CONSTRUCTION COST:	**$1,190,000**

EXHIBIT D

City of Kansas City, Missouri

Opinion of Probable Bridge Rehabilitation Cost **Kentucky Ave. Bridge over Rock Creek**

Bridge Rehabilitation (Superstructure Replacement) **Bridge Number: S022B21**

Remove the existing reinforced concrete slab end spans and the existing reinforced concrete tee girder main span and construct a new superstructure. Repair substructure. Add concrete bridge approach slabs and guardrail.
With this rehabilitation, the expected service life of the bridge is 25- 50 years.

Designed by: MAH
Date: 7/13/2020
Job Number: 16882

General Information:

- Remove existing concrete slab end spands and concrete tee girder main span.
- Construct new bridge superstructure using spread prestressed concrete box girders.
- Modify abutments and piers to receive 17" deep prestressed concrete box girders in both end spans.
- Modify abutments and piers to receive 27" deep prestressed concrete box girders in the main span.
- Widen the roadway from 20 ft. to 24 ft.
- Repair substructure concrete.
- Construct concrete bridge approach slabs.
- Modify roadway approaches (grading and pavement) to accomodate higher bridge grade.
- Construct approach guardrail.

Repair Costs:

Removal	Comment	Unit	Cost / Unit	Number of Units	Total Cost
Asphalt Milling	Mill ~2 in. thickness off bridge deck	SY	$15.00	250	$3,750
Bridge Superstructure Removal	Remove concrete slab end spans and concrete tee girder main span	L.S.	$35,000.00	1	$35,000
Bridge	**Comment**	**Unit**	**Cost / Unit**	**Number of Units**	**Total Cost**
Slab on Concrete Beam	New concrete bridge deck	SY	$335.00	270	$90,450
Concrete Barrier	Type D	LF	$105.00	183	$19,215
17" Deep Prestressed Conc. Box Beam	End spans	LF	$300.00	132	$39,600
27" Deep Prestressed Conc. Box Beam	Main span	LF	$280.00	142.5	$39,900
Deck Drain		Each	$400.00	10	$4,000
Concrete Approach Slab	Standard 20 ft. long MoDOT approach slabs	SY	$160.00	120	$19,200
Substructure Modifications		L.S.	$15,000.00	1	$15,000
Substructure Concrete Repairs	Repair spalls and delaminations on substructure	SF	$150.00	100	$15,000
Roadway / Grading / Miscellaneous	**Comment**	**Unit**	**Cost / Unit**	**Number of Units**	**Total Cost**
Roadway Grading and Surfacing	Grading and pavement on both bridge approaches	L.S.	$175,000.00	1	$175,000
Approach Guardrail	Install at all four corners of bridge	L.S.	$25,000.00	1	$25,000

Subtotal:	**$481,115**
12% Mobilization	**$58,000**
25% Contingency	**$134,885**
TOTAL CONSTRUCTION COST:	**$674,000**

EXHIBIT E

City of Kansas City, Missouri

Opinion of Probable Bridge Repair Cost — **Kentucky Ave. Bridge over Rock Creek**

Short Term Bridge Repairs (Deck Repairs) — **Bridge Number: S022B21**

Minimum repairs that need to be completed in order to re-open the bridge to traffic.
With these repairs, the expected service life of the bridge is 5 - 10 years.

Designed by: MAH
Date: 7/13/2020
Job Number: 16882

General Information:

- Mill off asphalt wearing surface on deck.
- Perform partial depth and full depth concrete deck repairs.
- Perform limited substructure repairs--mostly removing loose concrete and coating exposed surfaces with epoxy.

Repair Costs:

Removal	Comment	Unit	Cost / Unit	Number of Units	Total Cost
Asphalt Milling	Mill ~2 in. thickness off bridge deck and about 10 ft. each approach roadway.	SY	$15.00	250	$3,750
Bridge	**Comment**	**Unit**	**Cost / Unit**	**Number of Units**	**Total Cost**
Half-Sole Bridge Deck Repair	Estimate 40% of bridge deck requires half-sole or	SF	$80.00	500	$40,000
Full Depth Bridge Deck Repair	full depth repair.	SF	$130.00	230	$29,900
Asphalt Overlay	Replace asphalt overlay	Tons	$250.00	27	$6,750
Replace Misc. Deck Reinforcing Steel		L.S.	$3,000.00	1	$3,000
Clean and Epoxy Coat Concrete Surfaces	Remove loose substructure concrete and coat exposed surfaces with epoxy.	SF	$50.00	100	$5,000
Roadway / Grading / Miscellaneous	**Comment**	**Unit**	**Cost / Unit**	**Number of Units**	**Total Cost**
None					

Subtotal:	**$88,400**
15% Mobilization	**$13,000**
25% Contingency	**$25,600**
TOTAL CONSTRUCTION COST:	**$127,000**

GENERAL PHOTOS

Bridge:	S022B21, KENTUCKY AVE.	Inspection Date:	5/1/2020	Owner:	CITY OF KCMO	Inspector:	MARK HARTEGAN, PE STEVE HILEMAN, PE

PHOTO 1 LOOKING EAST: Temporary concrete barriers at west end of bridge

PHOTO 2 LOOKING WEST: Roadway looking west; 24 Ton sign on east approach; overhead power lines on both sides of roadway

PHOTO 3 LOOKING WEST FROM WEST END OF BRIDGE: City of Independence wastewater treatment facility on parcel NW of bridge

PHOTO 4 LOOKING WEST: Temporary concrete barriers at east end of bridge

UTILITY PHOTOS

Bridge: S022B21, KENTUCKY AVE. Inspection Date: 9/11/2019 Owner: CITY OF KCMO Inspector: STEVE HILEMAN, PE

PHOTO 5 LOOKING EAST: Stream gauging station on top of bank just northwest of bridge

PHOTO 6 LOOKING SOUTHEAST: Stream gauging station intake pipes laying on ground under west span of bridge

PHOTO 7 LOOKING WEST: 12 in. diameter gas line attached to south side of bridge

PHOTO 8 LOOKING NORTH: Sanitary sewer pipe crossing the creek about 25 ft. north of the north edge of the bridge

TOP OF DECK PHOTOS

Bridge:	S022B21, KENTUCKY AVE.	Inspection Date:	5/1/2020	Owner:	CITY OF KCMO	Inspector:	MARK HARTEGAN, PE STEVE HILEMAN, PE

PHOTO 9 LOOKING EAST: Concrete bridge deck with asphalt overlay

PHOTO 10 LOOKING EAST AT EAST END OF MAIN SPAN: 5.5 ft. x 3.5 ft. hole in bridge deck

PHOTO 11 LOOKING WEST AT MAIN SPAN: 5.5 ft. x 3.5 ft. hole in bridge deck

PHOTO 12 LOOKING EAST AT MAIN SPAN: Potholes in asphalt overlay in WB lane

TOP OF DECK PHOTOS

Bridge:	S022B21, KENTUCKY AVE.	Inspection Date:	5/1/2020	Owner:	CITY OF KCMO	Inspector:	MARK HARTEGAN, PE STEVE HILEMAN, PE

PHOTO 13 LOOKING SOUTH: Spalling on curb at south bridge rail

PHOTO 14 LOOKING SOUTH: Spalling on curb at south bridge rail

PHOTO 15 LOOKING NORTH: Spalling on curb at north bridge rail

PHOTO 16 LOOKING NORTH: Spalling on curb at north bridge rail

WEST APPROACH SPAN (SLAB SPAN) PHOTOS

Bridge:	S022B21, KENTUCKY AVE.	Inspection Date:	5/1/2020	Owner:	CITY OF KCMO	Inspector:	MARK HARTEGAN, PE STEVE HILEMAN, PE

PHOTO 17 LOOKING WEST: Moderate efflorescence on west abutment

PHOTO 18 LOOKING WEST: Cracking and areas of moisture on bottom of reinforced concrete slab span

PHOTO 19 LOOKING WEST: Heavy spalling with exposed reinforcing steel on south edge of slab

PHOTO 20 LOOKING NORTH: Moderate spalling with efflorescence on north edge of slab

MAIN SPAN (CONCRETE TEE GIRDER) PHOTOS

Bridge:	S022B21, KENTUCKY AVE.	Inspection Date:	5/1/2020	Owner:	CITY OF KCMO	Inspector:	MARK HARTEGAN, PE STEVE HILEMAN, PE

PHOTO 21 LOOKING EAST: Cracking, efflorescence and some spalling with exposed reinforcing steel on south girder

PHOTO 22 LOOKING EAST: Two interior girders in satisfactory condition; hole in deck near east pier

PHOTO 23 LOOKING WEST: Cracking, efflorescence and some spalling with exposed reinforcing steel on south girder; bottom of concrete deck in fair condition overall

PHOTO 24 LOOKING WEST: Cracking and efflorescence on north girder; hole in deck near east pier

EAST APPROACH SPAN (SLAB SPAN) PHOTOS

Bridge:	S022B21, KENTUCKY AVE.	Inspection Date:	5/1/2020	Owner:	CITY OF KCMO	Inspector:	MARK HARTEGAN, PE STEVE HILEMAN, PE

PHOTO 25 LOOKING EAST: Moderate efflorescence on east abutment

PHOTO 26 LOOKING EAST: Cracks with efflorescence and moisture staining on bottom of reinforced concrete slab span

PHOTO 27 LOOKING SOUTHEAST: Spalling with exposed reinforcing steel along south edge of slab

PHOTO 28 LOOKING SOUTHWEST: Spalling on exterior side of north barrier

PIER PHOTOS

Bridge:	S022B21, KENTUCKY AVE.	Inspection Date:	5/1/2020	Owner:	CITY OF KCMO	Inspector:	MARK HARTEGAN, PE STEVE HILEMAN, PE

PHOTO 29 LOOKING EAST: West pier west face has minor cracking and efflorescence at both ends of cap

PHOTO 30 LOOKING WEST: West pier east face has cracking, rust staining, delamination and efflorescence on cap

PHOTO 31 LOOKING EAST: East pier has cracking, rust staining and efflorescence on cap; rock retaining wall under east approach span; hole in deck near east pier

LOCHNER